

FORUM ON ENGINEERING LICENSING 2002 RESPONSES TO QUESTIONS FOR PUBLIC COMMENT

The Forum on Engineering Licensing 2002 was held at the Contractors State License Board Hearing Room on March 22, 2002. Two weeks earlier, notices publicizing the forum had been mailed to approximately 200 consumer and 85 engineering-related organizations known to DCA as potentially interested in licensing issues. A notice also appeared on the DCA website two weeks prior to the date of the forum.

A dozen participants and three Board and DCA representatives attended the Forum. Four individuals represented engineering organizations associated with Title Act disciplines (fire protection, chemical, traffic engineering), three represented or were associated with Practice Act disciplines (civil and electrical engineering), two represented or were associated with the California Society for Professional Engineering that represents both sets of disciplines, and two represented the California Legislative Council of Professional Engineers that also represents both sets of disciplines. In addition, written or email communications were received from another 13 individuals, three from Practice Act disciplines (civil, mechanical, electrical), five from Title Act disciplines (agricultural, chemical, control systems, industrial and nuclear), one from an unlicensed discipline (software engineering) and four whose discipline was unknown.

A. HEALTH AND SAFETY CONCERNS

1. Do engineering disciplines differ in the degree to which their negligent practice could adversely affect the public health and safety?

Participants seemed to agree that all engineering disciplines affected public health, safety and welfare and that it was not possible to quantify discipline variations in the level of impact. Several participants believed that an error made by some engineering disciplines would injure more people while an error made by others would affect fewer. Several noted the omission of welfare in the question, encouraging its inclusion because engineering also influences quality of life, economic prosperity and other aspects of public welfare.

2. Are there any data that can be used to make this determination?

The answer was "no" for a variety of reasons. While there are anecdotal records of accidents resulting from engineering activities (in newspaper articles, incident reports to state agencies and lawsuits), the resolution of these incidents is often private (e.g., out-of-court settlements and insurance claims) and no agency is responsible for tracking their occurrence, determining culpability or disciplining those involved. Reported incidents are used to revise state codes in order to preclude other similar events. Finally, accidents that harm the public occur for a variety of reasons: operator error, material or equipment failures, management or supervisory decisions, and are not necessarily attributable to incompetent engineering. In projects involving many engineering disciplines, it would be difficult to apportion responsibility for the incident across the several disciplines.

3. Do any state agencies maintain records of incidents or operational failures that may be related to particular types of engineering decisions?

None of the participants were aware of any relevant publicly available data.

4. Are there any records of insurance claims traceable to particular types of engineering decisions?

No, this would be confidential information.

5. Are there any legal records of cases filed involving threats to public health and safety posed by the work of engineers?

Most lawsuits are settled out-of-court, leaving no public record. According to participants, court decisions in the civil arena are confidential. Moreover, unlike medicine, there is no requirement that court decisions involving licensed engineers be reported to the PELS Board. Thus, there is no connection between civil redress for harm and professional accountability.

6. The Board for Professional Engineers and Land Surveyors maintains a system for filing complaints against engineers or unlicensed persons engaged in engineering practice, and disciplining violators. Does this system adequately protect the public health and safety?

Many participants observed that disciplinary actions by the PELS Board focus on the performance of practice act tasks by unlicensed or inappropriately licensed individuals rather than on incompetent practice by licensed engineers. A system of self-certification is in effect whereby individuals are enjoined to practice within their area of competence (Rule 415?). While the examination process determines minimum competency in an engineering discipline, subsequent experience and an individual's self-assessment creates an "area of competence." There are some limitations on self-certification: title act engineers may not self-certify in a practice act discipline, nor electrical and mechanical engineers declare competence in civil engineering. Civil engineers, however, may assert competency in any branch of engineering. Several participants felt that incompetence was controlled by "market forces" or by the actions of public agencies through plan checking and the enforcement of building codes. Others noted that incompetence only came to light after the damage was done and redress was sought in the courts.

7. Engineers employed by corporations or other licensed engineers are exempt from licensing. What effect does this exemption process have on public health and safety?

Forum participants expressed a range of opinions on exemptions from licensing, from full support to a belief that they should be eliminated. Arguments in favor of the industrial exemption, specifically, include: (a) corporations believe they can assess competency independent of licensing and that they should have control over the assignment of job titles within their organizations; (b) tort law is considered adequate for dealing with product liability or construction defect issues; (c) since corporations, design teams and products span

multiple states and nations, they should not be controlled by the licensing laws of a single state; (d) while there is no room for experimentation and error in the building industry, failure is a normal part of the design process in manufacturing; (e) corporations are free to assign team leadership to the most appropriate discipline for the problem rather than be constrained to follow the hierarchy for responsible charge prescribed by the Engineer's Act. Several arguments were given in support of exempting employees of licensed engineers. The supervising engineers in these typically smaller firms are in responsible charge and they provide an essential training environment for engineers seeking the necessary experience for licensing.

Arguments against exemptions include: (a) the elimination of screening for minimal competence does not protect the public from injury; (b) the licensing process encourages a sense of individual responsibility among professional engineers; (c) licensing and the adherence to standards of practice that it requires protects engineers when they assert these standards in the face of inappropriate managerial decisions; (d) corporations assign engineering tasks to untrained employees.

B. CRITERIA FOR DISTINGUISHING TITLE AND PRACTICE ACT DISCIPLINES

1. What are the essential criteria that distinguish title act, practice act, and unregulated disciplines?

Participants could not identify any criteria that distinguish the degree of regulation. They observed that these are legal distinctions, based on the historical development of engineering, and they are unrelated to the actual practice of engineering. Most projects are accomplished by multi-disciplinary teams and led by an engineer with the most appropriate specialty. Practice act disciplines are irrelevant to many projects. The requirement that a practice act engineer be in responsible charge, therefore, adds to the cost of a project without substantively improving the outcome. In addition, various state and local codes assign responsibility to specific disciplines independent of the hierarchical authority defined in the PE Act.

The major differences among these disciplines were characterized as variations in degree of specialization, the number practicing in the discipline and the historical period in which the discipline developed. Practice act disciplines are the oldest and most populous, largely associated with the built environment, with the most generalized knowledge base. The title act disciplines are more specialized and have developed more recently with rapid growth in the development of new technologies and the application of the physical sciences (chemistry, biology) to problems in the physical and medical environment (air and water pollution, health-related). The unregulated disciplines are also highly specialized and either attract so few engineers that they do not justify an NCEES exam or they work in environments where the oversight that regulation provides is not desired and the impact of their work on public health and safety is unclear.

2. What are the reasons for making a distinction between these groups of disciplines?

All participants supported maintaining a distinction between unregulated and regulated engineers, arguing that the right to sign, seal or stamp engineering reports, plans and other documents should be restricted to those with a certified minimum level of competency. When an engineer's actions affect the health, safety and welfare of other people, they should be regulated. No one appeared to support maintaining a distinction between the current practice and title branches. They cited the many similarities in formal education, on-the-job training and the examination process.

3. Should California maintain this distinction (specifically, between practice and title acts) when other states do not?

The general feeling was "no." In a survey of other states, CSPE found that most boards were satisfied with their approach to licensing and none expressed any interest in adopting California's approach. It was reported that the Los Angeles section of the American Nuclear Society has argued that California should adopt the system used by most states, where the responsibility is placed on individual engineers to only sign those documents that lie within their areas of expertise.

4. What public protection is offered by the Title Acts? What is the state getting in return for its administration of the examinations certifying the Title Act disciplines?

One argument in favor of Title Acts is that they reflect the increased specialization of engineering, providing employers with specialists in areas of practice not possessed by a typical civil, mechanical or electrical engineer. The required span of knowledge of theory, materials, codes, standards and recommended practices is simply too great for a single discipline. Some public agencies have recognized the need for specialists, requiring, for example, traffic engineers to stamp transportation plans or fire protection engineers to be involved in designing an airport's fire protection system. Another argument in favor of at least retaining registration of title act disciplines (whether as practice or title acts) is that, since the registrations are based on nationally recognized examinations, California engineers can receive a license by comity from other states. Eliminating registration of title act disciplines would adversely affect the ability of California engineers to obtain work in other states. One participant argued against retention of the Title Acts because they reduce protection of the public. For example, even though a title act engineer may be most qualified to lead a particular project, a practice act engineer, who may be less knowledgeable, must approve the document. This could jeopardize the public health, safety and welfare.

C. DISCIPLINE OVERLAP ISSUES

1. Are there some tasks that all engineers should be allowed to do regardless of the branch they are licensed in?

Several participants felt that all engineers should be allowed to perform any task covered in the core curriculum taken by all engineering students. Others made the point that a large

portion of engineering work can be done by several types of engineers. For example, permitting for hazardous waste facilities could be done by civil or chemical engineers and issues relating to the flow of liquids through pipes are common to civil, mechanical, nuclear, chemical and petroleum engineering. There is no reason to limit approval of documents involving the flow of fluids through pipes to civil and mechanical engineers. The point was made that permitting for hazardous waste facilities and plan-checking for building code enforcement can be accomplished by non-engineers as long as they understand what is required. There is a distinction between adhering to standards for performance and defining them. Selecting the best means for achieving an objective requires greater knowledge and engineering skills than confirming that those means have been properly utilized in routine situations.

2. Should each branch of engineering be limited to work in its defined sphere with no one branch allowed to overlap others? Currently, these spheres are defined in the Engineer's Act and Board Rules, but some branches are given more authority than others. What are the reasons for maintaining the established hierarchy of branches in the assignment of responsible charge? Does technological change have any implications for the allocation of responsibility among engineering branches?
3. Or alternatively, what would be the threat to public health and safety if you dropped distinctions between the work engineers are authorized to do?

There was general agreement that solutions to real world problems are multi-disciplinary in nature and that the knowledge required is not neatly contained in a single discipline. Most engineering decisions include cross-disciplinary issues, a fact recognized by engineering degree programs that include core courses in areas such as material properties, statics, dynamics, thermodynamics, fluid flow, mathematical concepts and electrical theory. Many participants felt that it would be impossible to create work spheres that adequately reflect the real engineering world. Moreover, solutions by an engineer in one discipline would differ from those proposed by an engineer in another. Artificially restricting solutions to a single discipline may result in unnecessary costs or in less than optimal solutions

While there was general agreement that overlap is both unavoidable and supported by a common core of engineering coursework, there was also considerable agreement that the allowable overlap in the current Engineering Act and Board rules does not reflect today's engineering world. Voicing the sentiment of most of those attending the Forum, one participant said: "Overlap shouldn't be a one-way street with only civil allowed to overlap into the other branches." Most felt that neither the education nor experience of the typical civil engineer was sufficient to exert responsible charge over the work of more specialized disciplines. Permitting civil engineers to overlap other practice and title act disciplines and mechanical and electrical to exert responsible charge over title act disciplines outside their areas of expertise reflects the historical development of engineering and its focus on the built environment and ignores the impact of rapidly changing technologies on the field. The hierarchical nature of the assignment of responsible charge also distorts the licensing process if engineers in the more specialized and less powerful branches seek licensing in the practice branch area closest to their specialty. Multiple examples of this distortion were given. Several participants indicated that mechanical engineers sought civil licenses because (a) the

exam was reportedly easier and (b) the license increased job opportunities. Another observed that half of the recently licensed nuclear engineers in southern California took the mechanical engineering exam rather than the nuclear engineering exam because the former was a practice act. This same person noted that even in a specialized field like nuclear engineering, only a small part of the work done is discipline-specific. Most nuclear engineering work overlaps at least one other engineering discipline.

Several participants felt that rapidly changing technology -- from biomedical to software engineering -- makes it even more critical that the most qualified person, regardless of discipline, be in responsible charge. Changing technology demands new partnerships, often with as yet unlicensed disciplines. With backgrounds in the biological or computer sciences and projects totally unrelated to the built environment, engineers in newly developing specialties will eschew licensing or seek exemption for their industry to avoid inappropriate supervision of their work. At least one participant believed that arbitrary distinctions between practice and title acts threatens rather than protects public health, safety and welfare. If, as many participants asserted, 80% of engineers nationally are unlicensed, the question arises whether there can be any public health and safety justification for the current licensing system.

4. Is practice outside one's area of expertise a significant problem? Are there a lot of cases where people are disciplined for such practice? Where is the data for this? Where are the laws that prohibit this?

Most participants agreed that practice outside an individual's area of expertise is not a significant problem. Several believed that, even in the absence of any regulation by the California Engineer's Act, the business and legal systems would serve to protect the public. One observed that most disciplinary actions are against unlicensed individuals and that the number of people disciplined for practice outside of their nominal area of practice, as defined by the license they hold, is small. Several felt that it would not be a problem if Rule 415 (working within the limits of one's competence) were vigorously enforced. If the practice/title act distinction were eliminated and greater reliance placed on Rule 415, the loss of a license would be more meaningful for title branch engineers who, under the current system, may practice without a license.